Results of an Investigation of Architecture Issues for DIS-HLA Conversion

Integrated Training Program

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Topics

- **Description of DIS-HLA conversion experience**
- **Feedback on the DIS-HLA conversion experience**
- **Assessment of experience on DIS-HLA transitions**

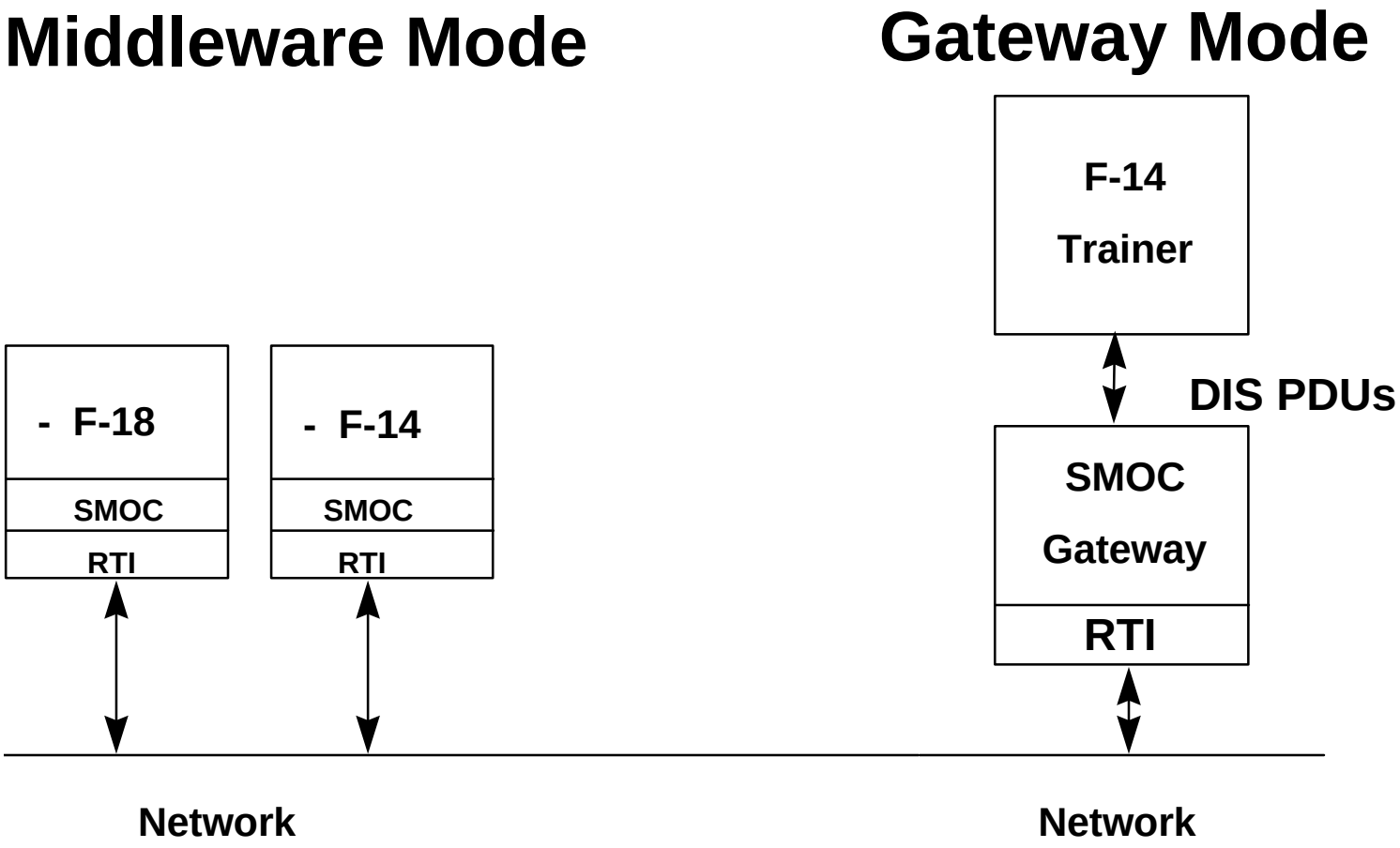
Outline

- **Introduction**
- **System Design**
- **System Development**
- **System Testing**
- **Uses**
- **Assessment**

Background

- **3 Phases of Research**
  - Pre-Implementation
  - Implementation
  - Results/Lessons Learned
- **4 Focus Areas**
  - HLA Rules of Usage
  - HLA Interface Specification
  - OMT (SOM & FOM)
  - HLA Gateway
- **HLA Gateway**
  - Separate 6.2 effort
  - Translator approach
  - Scaleable DIS research
- **Simulation Middleware Object Classes (SMOC)**
- **NAWCTSD HLA Effort**
  - I/ITSEC HLA Demo

Simulation Middleware Object Classes (SMOC)



Key Strategies

- **Focused on O-O design approach**
- **Implementation of reusability, flexibility, and scaleability**
- **DIS and HLA interface in a single box**
- **Multiple platform support (Windows 95/NT, HP-UX, Solaris, and IRIX)**
- **RTI 1.0 and HLA Tools all must be supported**

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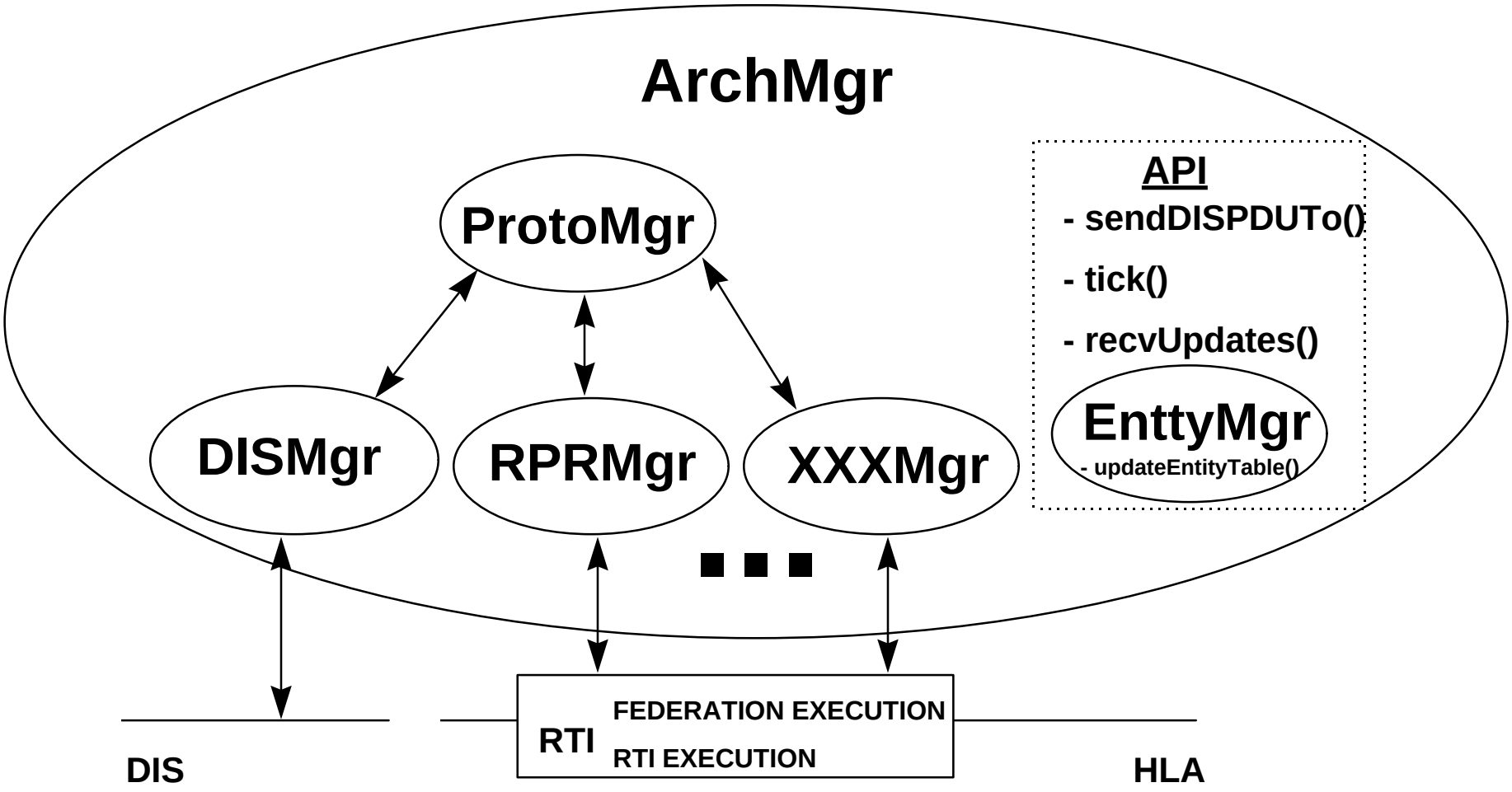
NAWCTSD Simulation Middleware Object Classes (SMOC) Architecture



NAWCTSD Simulation Middleware Object Classes (SMOC) Architecture

- **Different FOMs supported**
  - **Architecture data file supports the idea**
  - **Requires development of new object class for each FOM type (RPR-FOM already implemented)**
  - **Software “Knows” through polymorphism which instance to choose**
  - **No existing lines of code get changed**
  - **Supports exercise scaling as user can specify which channels data is sent/received on**

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Design and Specification

- **Strategies Investigated**
  - **HLA Gateway, translator approach**
  - **Middleware approach**
  - **Native approach**
- **HLA Focus Areas**
  - **HLA Rules**
  - **HLA Interface Specification**
  - **Object Model Template (FOM and SOM)**

FOM Development

- Downloaded Object Model Development Tool
- Downloaded RPR-FOM from DMSO web-site
- Used OMDT to modify RPR-FOM to a F-14 FOM
  - Deleted unwanted objects
  - Added emitter and signal objects for voice and video
- Saved file to .fed file and to DMSO Web site
- Used .fed file at runtime with FEDEX

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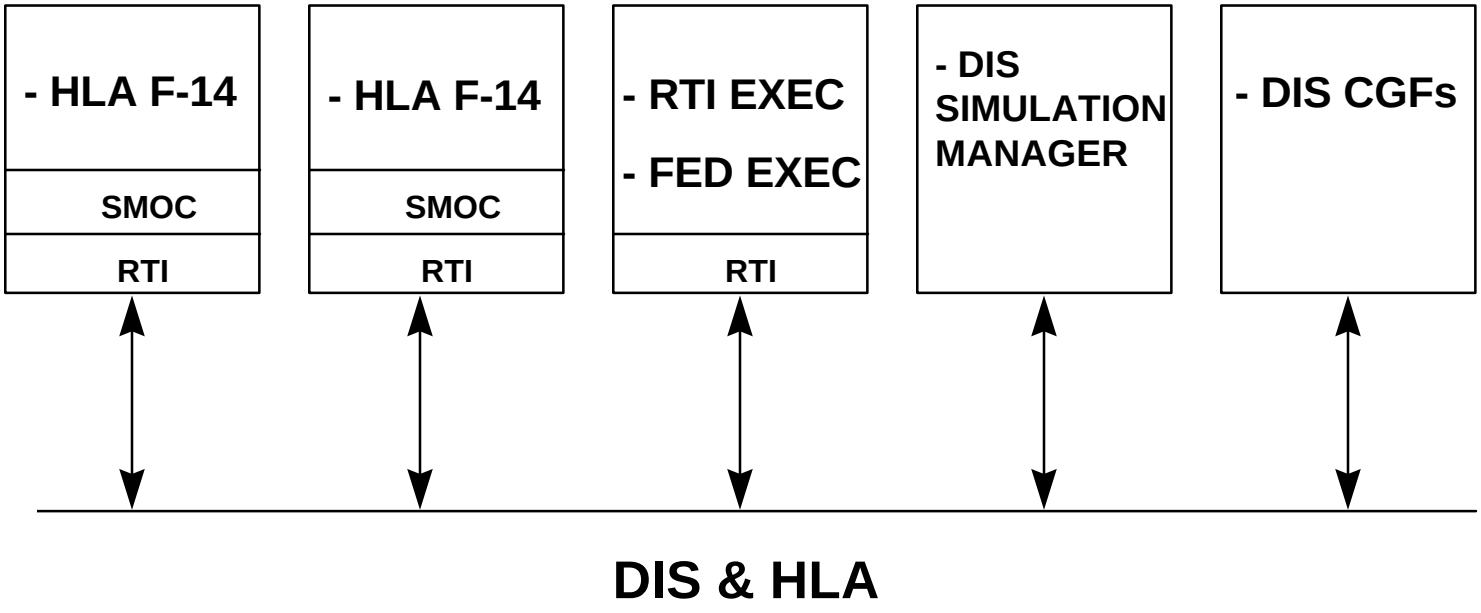
Testing

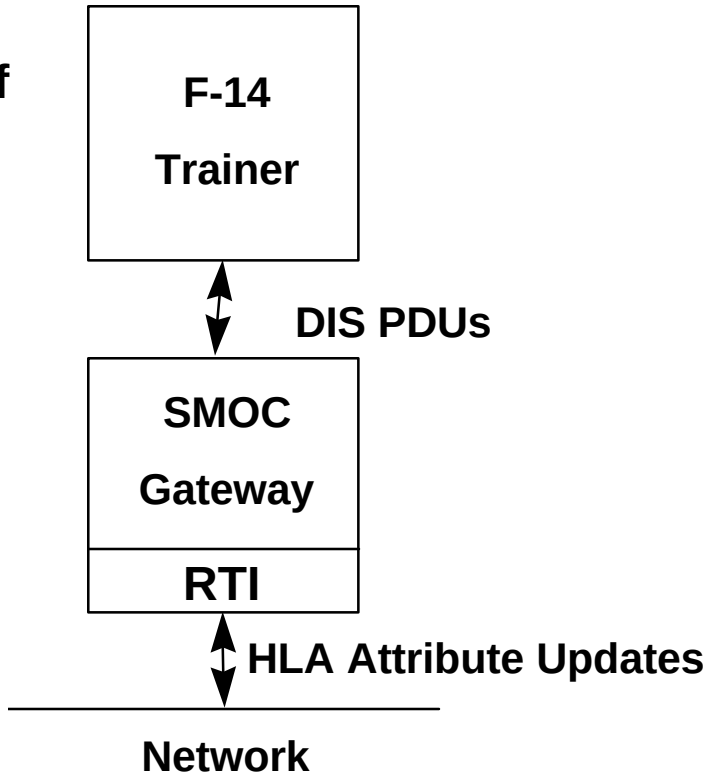
- **Testbed application at NAWCTSD**
  - **All federates and entities on a single physical network but using different channels**
  - **Two F-14 simulations use the SMOC to interact**
  - **CGF entities and DIS manager also interacting**
  - **F-14s see each other and all CGF entities**
  - **Can support all DIS and HLA combinations (2 HLA F-14s, 2 DIS F-14s, 1 DIS and 1 HLA F-14) all interacting simultaneously**

Testing

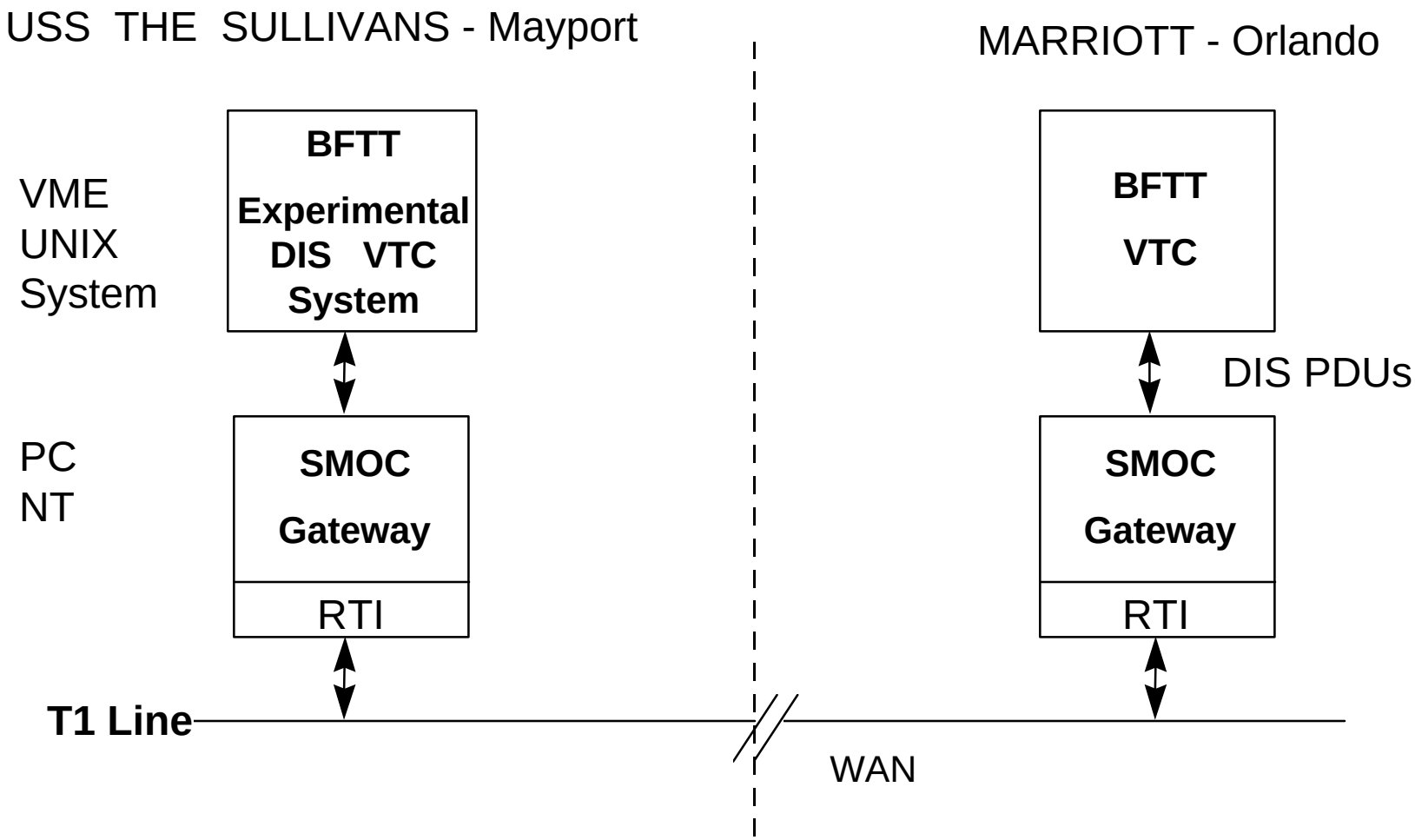

- HLA F-14
SMOC
RTI
- HLA F-14
SMOC
RTI
- RTI EXEC
- FED EXEC
RTI
- DIS SIMULATION MANAGER
- DIS CGFs
DIS & HLA

Testing

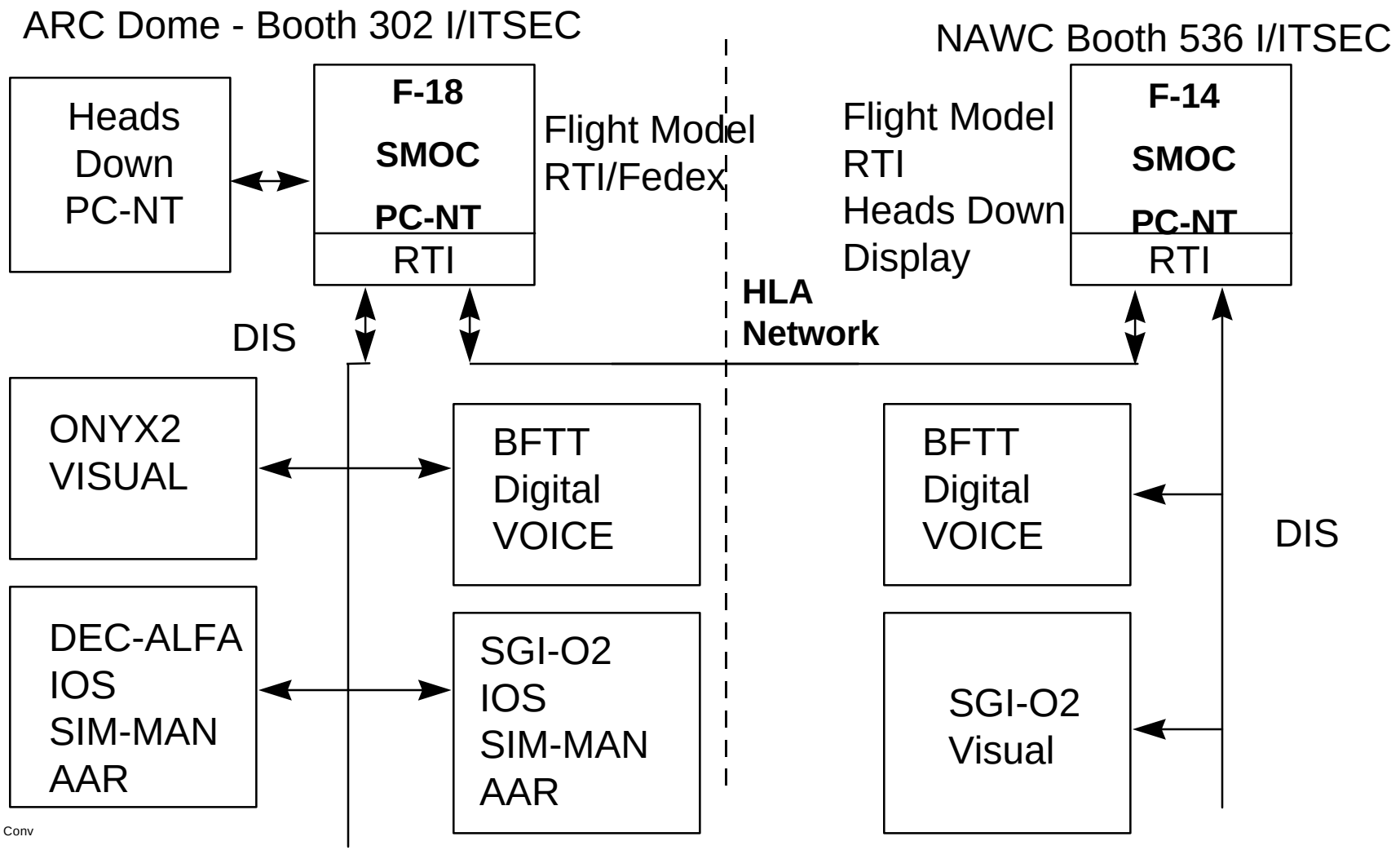
- **SMOC Performance in Gateway Mode**
  - **Delay of less than 3ms for small number of entities and objects**
  - **Latency went up as number of entities and objects increased.**
  - **At 100 attribute updates/sec HLA to DIS latency increased to around 14ms. For DIS to HLA latency only went up to around 5ms.**



I/ITSEC Implementation



I/ITSEC Implementation



Testing

- **SMOC Performance in Gateway Mode**
  - **Test for Voice throughput (Signal PDU) allowed near-real-time delivery of audio through the HLA with no perceivable delays**
  - **Test for Video throughput allowed for near-real-time delivery of Video through the HLA with no perceivable delays**

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SMOC USES

- Quick solution for a DIS-HLA migration (Gateway mode)
- Data Interoperability (RPR-FOM, OM Data Dictionary)
- Solution for existing trainers (No DIS) with middleware mode
- Solution for running DIS and /or HLA exercises without recompiling code or using a gateway
- Solution for Multiple FOM interoperability
- Solution for multiple RTIs

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Net Assessment

- HLA Processes
  - Provide framework for development
- HLA Products
  - RTI 1.0
  - Tools
- HLA Support available
  - Help-desks
  - Tools
  - Web sites
  - Reflectors
  - Other Users